



Using the TIU Terminal Range with a YASKAWA VS-606V7 Inverter.

Protocol Revisions

Version 1.00 Supports master only operation to the slave Inverter using a customised MODBUS RTU protocol. Communication to the Inverter is via the PLC Port on the TIU terminal and the appropriate screw terminals on the Inverter module.

The default settings are 9600 baud, eight data bits, no parity and one stop bit with no handshaking. The connection is RS 422/485 communications. See attached drawings.

Correct Firmware

The TIU terminal will only communicate with the Drive if it has the appropriate firmware installed. This will be displayed on the front screen of the terminal during "power up".

If new firmware needs installing the appropriate file for the terminal type is required i.e.

Tiu050 = YASKAWA_R?.0xx

Tiu1xx = YASKAWA _R?.1xx

Tiu2xx = YASKAWA _R?.2xx

? = The TIU firmware revision.

To install the correct firmware into the TIU terminal carries out the following procedure: -

Select "Configure" / "Terminal type" to select the TIU type and initialise all relevant parameters.

Select "Configure" / "Communication Settings" and then select the "Manufacturer" and "Model" being used and also check that Communication Mode, Baud Rates and Network details are all correct.

After all settings are confirmed as correct, select File / Update protocol. If the above has been completed the computer should have selected the correct file to download. Accepting this option will automatically initiate the protocol download to the TIU.

Initial Settings.

In order to communicate to the Inverter, it is first necessary to set up some registers from the front panel.

N001 will need to be set to 4 to allow access to the full range of registers. (Default is 1 for 001 to 049).

N003 (103H in protocol) will need to be set to 2 to allow communications.

N004 (104H in protocol) will need to be set to 6 to allow frequency reference to set by communications.

The communication parameters in the inverter can be changed from the front panel controls if required, using n152 – n157. The TIU configurator shows the normal default values. The registers are as follows: -

N003	Run Command selection	0: Operator 1: Control Circuit terminals 2: Communications	Initial Settings 0
N004	Frequency Reference	0: volume (digital operator) 1: frequency ref. (n024) 2: control circuit terminals (V 0-10) 3: control circuit terminals (I 4-20mA) 4: control circuit terminals (I 0-20mA) 5: control circuit terminals (pulse train) 6: communication control	0
N151	Time-over Detection	0: free run stop 1: coasting to stop with time 1 2: coasting to stop with time 2 3: continuous operation with warning 4: time-over detection not provided	0
N152	Frequency ref. units	0: 0.1 Hz 1: 0.01 Hz 2: 30000/100% (30000=max frequ.) 3: 0.1%	0
N153	Slave Address	Setting Range 0-32	0
N154	Baud Rate	0: 2400 bps 1: 4800 bps 2: 9600 bps 3: 19200 bps	2
N155	Parity	0: even 1: odd 2: none	0
N156	Sending wait time	10- 65mS setting unit 1ms	10mS
N157	RTS Control	0: RTS Control 1: no RTS	0

Node Addresses

Global Remote Node ID default address is 0.

The address can be changed in parameter n153 (Modbus 0199Hex) within a range 1 to 32. This can be changed from the TIU but obviously, once changed, communication will no longer be possible until the Communication node address has been changed in the configuration to be the same as the Drive.

Networking Drives

The communication interface is RS422 and as such up to 32 Inverters can be connected together on to a network. Each Inverter must have an individual address in a range 1 –32 that is set in n153 (199H) as described above.

The Network Option must be enabled from “Configure / Communication Settings / Network Mode Enable”. Cabling details are shown at the end of this document

Each item of embedded data will need to have the correct node address entered as part of the data set-up screen to indicate which Inverter is to be accessed.

Also the data can be selected to be editable from the TIU and data scaling can be set-up to convert values in the Inverter into engineering units. E.g. Inverter Frequency to Meters per Min

The manual supplied with the YASKAWA drive shows the register range and definitions. An example is shown below on how to communicate to register 17CH on Node address 27. Note that Node Addresses are in decimal, register addresses are hexadecimal.

Broadcasting to multiple drives simultaneously.

It is possible to send the same data to several Inverters simultaneously E.g. setting multiple Inverters to the same frequency.

To do this all data must be sent to Node Address 0. Every device on the network will then accept the data.

In order to implement WRITE then READ to confirm register values, the TIU will automatically read back from Station 1 Therefore, one of the Inverters on the network must have an address of 1.

If no Address 1 is present on the network, the data field will show *****

Parameter Range

The parameters are specified in two ways, a "N" number and a corresponding "hexadecimal" number that is used within the communication to the Inverter.

The full parameter range is of Internal Words n001 (Modbus 101 Hex)) to n179 (Modbus 01B3 Hex) is implemented. Addresses must be entered using the Modbus Hex address.

A detailed list of the full range of parameters available for this Inverter is not within the scope of this document and reference should be made to the appropriate YASKAWA manual.

Basic Control Parameters-

With the set up as shown, the following parameters are used to do basic control of the Inverter. Obviously all other parameters and settings that are available through communications can be used.

UNITS FOR FREQUENCY	0198H	(N152 - range 1 to 4)
RUN FREQUENCY REGISTER	0002H	(Format as per UNIT setting)
FREQUENCY OUTPUT	0024H	(Format as per UNIT setting)
RUN CONTROL	0001H bit 0	(Use bit instructions)
DIRECTION CONTROL	0001H bit 1	(Use bit instructions)

All the addresses use Internal Words within this range. Where it is necessary to make reference to a bit condition e.g. FORWARD / REVERSE, the "bit token" embedded data field features should be used. There are also special Data registers Data 001 (Modbus 001Hex) to 03D (Modbus 03D Hex). These are used for special control operations and again can be included in TIU screens using "bit tokens".

An example of setting up a "bit token" is as follows: -

Enter basic text e.g. DIRECTION then "Double click" on the TIU screen where the token is to be placed and then select the bit operator. The following dialogue box needs to be completed.

Note that it is not necessary to enter a "Remote Node ID" on a single Inverter set-up.

Configure Bit Status Embedded Data

Remote Data Source

Remote Node ID: 1

Data Type: Internal Word

Location: 1 Bit Number: 1

Display Format

"REVERSE"/"FORWARD"

16-Bit 32-Bit

Edit/Write

Enabled

Attributes

Flashing

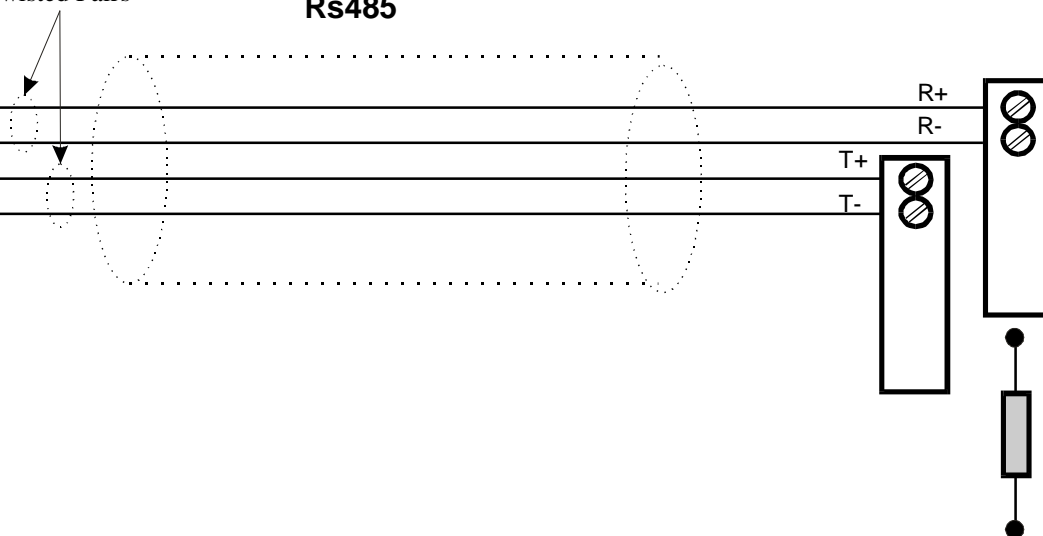
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TIU 100/110

+5V	1
TX 485/422+	2
TX 485/422-	3
RX 485/422+	4
RX 485/422-	5
TX RS232	6
0V (GND)	7
RX RS232	8
TX 20mA +	9
TX 20mA-	10
RX 20mA+	11
RX 20mA-	12
EARTH	13

Twisted Pairs

Rs485

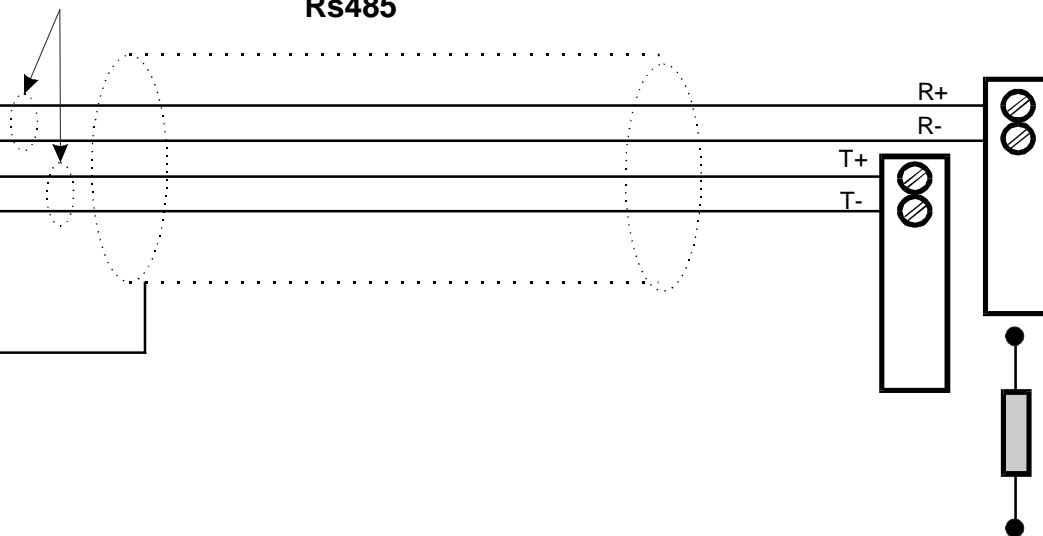


TIU 50/101/102/ 111/112/20X

TX 485/422+	1
TX 485/422-	2
RX 485/422+	3
RX 485/422-	4
TX RS232	5
0V (GND)	6
RX RS232	7
SHIELD	8

Twisted Pairs

Rs485



Configuration Bank

Switch	ON	OFF
1	Pull-up	No Pull-up
2	120 termination	No termination
3	Pull-down	No Pull-down
4	Reserved for future use	

NOTE: Switch 1 and 3 must be used together.

